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Attorney Docket No. DYOUNP0218US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PATENT application of:

Applicant(s): David Horne et al.
Serial No: 09/889,685
Filed: July 19, 2001
Title: HINGE CONNECTION

SUBMISSION OF PRIORITY DOCUMENT(S)

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Regarding applicant's claim to convention priority, enclosed herewith is/are certified copy/copies of the following priority application(s):

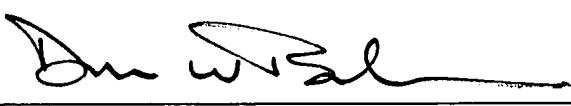
GB 9901144.7 filed 19 January 1999

Please acknowledge receipt of the enclosed priority document(s).

Respectfully submitted,

RENNER, OTTO, BOISSELLE & SKLAR

By

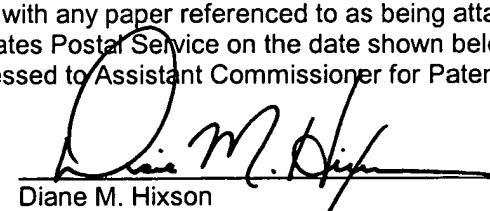

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CERTIFICATE OF MAILING

I hereby certify that this correspondence (along with any paper referenced to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to Assistant Commissioner for Patents, Washington, D.C. 20231.

Date: 8-30-01


Diane M. Hixson



00/889685



INVESTOR IN PEOPLE

The Patent Office
Concept House
Cardiff Road
Newport
South Wales
NP10 8QQ

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation and Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein together with the Statement of inventorship and of right to grant of a Patent (Form 7/77), which was subsequently filed.

I also certify that by virtue of an assignment registered under the Patents Act 1977, the application is now proceeding in the name as substituted.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

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Dated 27 July 2001





The
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GB9901144.7

By virtue of a direction given under Section 30 of the Patents Act 1977, the application is proceeding in the name of

APW ELECTRONICS LIMITED
Electron Way
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EASTLEIGH
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Incorporated in the United Kingdom

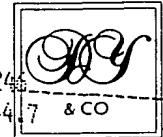
[ADP No. 07719974001].

Patents Form 1/77

Patent Act 1977
(Rule 16)

The
**Patent
Office**

20 JAN 99 E419056-17 D0224
-P01/7700 0.00 - 9901144

**Request for a grant of a patent**

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

19 JAN 1999

The Patent Office

Cardiff Road
Newport
Gwent NP9 1RH

1. Your reference

P006185GB MP

2. Patent application number

(The Patent Office will fill in this part)

19 JAN 1999

9901144.7

3. Full name, address and postcode of the or of each applicant
(underline all surnames)

VERO Electronics Limited
Electron Way
Chandler's Ford
Eastleigh
HAMPSHIRE SO53 4ZR

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

British

4. Title of the invention

HINGE CONNECTION

5. Name of your agent (if you have one)

D YOUNG & CO

"Address for service" in the United Kingdom to which all correspondence should be sent
(including the postcode)

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LONDON
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Patents ADP number (if you have one)

59006 ✓

6. If you are declaring priority from one or more earlier patent applications, give the country and date of filing of the or each of these earlier applications and (if you know it) the or each application number

Country

Priority application number
(if you know it)

Date of filing
(day/month/year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and filing date of the earlier application

Number of earlier application

Date of filing
(day/month/year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:
a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
c) any named applicant is a corporate body.
See note (d))

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Description 6
Claims(s) 3
Abstract 0
Drawing(s) 4 *XO* *Xx*

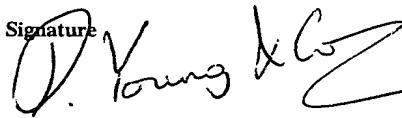
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Priority documents 0
Translations of priority documents 0
Statement of inventorship and right to grant of a patent (Patents Form 7/77) 0
Request for preliminary examination and search (Patents Form 9/77) 1
Request for substantive examination 0
(Patents Form 10/77)
Any other documents 0
(please specify)

11.

I/We request the grant of a patent on the basis of this application.

Signature



Date

19 Jan 1999

D YOUNG & CO
Agents for the Applicants

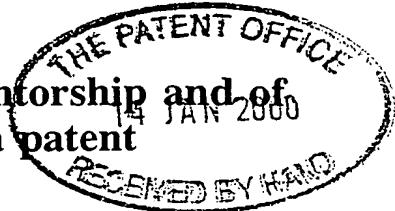
12. Name and daytime telephone number of the person to contact in the United Kingdom P.A.K.PRICE. 0171 353 4343

Warning

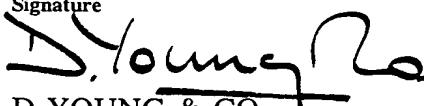
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Statement of inventorship and of
right to grant of a patent

The Patent Office
Cardiff Road
Newport
Gwent NP9 1RH

1. Your reference	P006185GB MP	
2. Patent application number (if you know it)	9901144.7	
3. Full name of the or of each applicant	APW Electronics Limited	
4. Title of the invention	HINGE CONNECTION	
5. State how the applicant(s) derived the right from the inventor(s) to be granted a patent	By virtue of an Assignment dated 28 October 1999 between ourselves and the overnamed inventors	
6. How many, if any, additional Patents Forms 7/77 are attached to this form? (see note (c))	0	
7.	I/We believe that the person(s) named over the page (and on any extra copies of this form) is/are the inventor(s) of the invention which the above patent relates to	
	Signature	Date
	 D YOUNG & CO Agents for the Applicants	14 01 2000
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Enter the full names, addresses and postcodes of the inventors in the boxes and underline the surnames

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4/2 16.2.2001

Patents ADP number (if you know it):

1653893003

6653893003

Reminder

Have you signed the form?

Patents ADP number (if you know it):

HINGE CONNECTION

This invention relates to a hinge connection particularly but not exclusively suited for forming a hinge connection between a frame of an electrical cabinet and a removable door panel thereof.

Electrical cabinets generally comprise a frame for receiving sub-racks of electrical and electronic components, and other items such as cooling fans. The frame is clad in side panels and an openable door panel. These panels are usually removable in order to facilitate the fitting of the components to the frame during initial manufacture, and also to facilitate in-use servicing of the components. The cabinet can be quite tall (typically 2 metres) and therefore the removable door panel can be quite bulky and also quite heavy, and is accordingly sometimes difficult for a person to position accurately when trying to fit the door panel onto the frame by aligning the hinge pins of the frame with hinge holes formed in the door panel.

According to a first aspect of the present invention, there is provided a hinge connection comprising:

a hinge arm at the end of which is a hinge pin; and

a hinge recess having a corner for guiding the hinge arm to a first position at which the hinge arm is seated in the corner and from which the hinge arm is slidable relative to the hinge recess along the corner to a second position to insert the hinge pin into a hinge hole of the recess whilst unseating the hinge arm from the corner.

Because the corner of the hinge recess guides the hinge arm to the first position, it becomes easier to fit a door panel incorporating the hinge recess onto a cabinet frame incorporating the hinge arm. Usually, the operator needs only to achieve general approximate alignment of the hinge arm with the hinge recess, before pressing the door panel with the hinge recess onto the hinge arm to achieve the

necessary correct alignment represented by the first position. The operator may then release the weight of the door panel and the weight of the door panel will cause it to drop downwards, producing movement from the first position to the second position at which the hinge pin is correctly received in the hinge hole. During this movement, the hinge arm that was previously seated in the corner is unseated therefrom, so that during use of the hinge there will be no unwanted frictional rubbing of the hinge arm on the corner of the hinge recess. Thus, the seating function of the hinge arm in the recess is provided only when it is needed (during assembly of the hinge connection) and is dispensed with when it is no longer needed (during subsequent use of the hinge connection).

Preferably, the end of the pin is chamfered such that, during the movement from the first position to the second position, the chamfer lifts the hinge arm out of seated engagement with the corner of the recess. The degree of the chamfering of the pin can be matched to the amount of unseating of the hinge arm from the corner that is required.

Whilst in some embodiments the hinge pin itself may be the component of the hinge arm which seats in the corner of the hinge recess, it is preferred that the hinge arm has a spacing member which:

- protrudes radially beyond the hinge pin;
- in the first position is in seated engagement with the corner of the recess whilst spacing the hinge pin away from the corner; and
- in the second position is no longer in seated engagement with the corner.

In many embodiments, the spacing member has a cylindrically curved surface. This surface may be only partially annular, but in many embodiments it may be a complete annulus such that the spacing member has a spacing surface which is circumferentially a complete cylinder.

In some embodiments, the hinge pin will be freely rotatable in a main arm portion of the hinge arm. In other embodiments, the spacing member is integral with the hinge pin and these components are rotatably mounted at the end of a main arm portion of the hinge arm.

According to a further aspect of the present invention, there is also provided an electrical cabinet for electronic and electrical components, comprising a hinge connection as described above and a frame having a frame member at the end of which is the hinge arm and a removable door panel including the hinge recess.

A non-limiting embodiment of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:-

Fig. 1 is a perspective view of a hinge arm of a hinge connection in accordance with the present invention;

Fig. 2 is a perspective view of a hinge recess of the hinge connection;

Fig. 3 is a perspective view of the hinge connection when in use, with the hinge arm fitted to a frame of an electrical cabinet and the hinge recess fitted to a removable door panel of the electrical cabinet; and

Fig. 4 is a plan view of the assembled hinge connection, showing the slight unseating that occurs in the second position.

The hinge connection comprises the hinge arm 1 shown in Fig. 1 and the hinge recess 2 shown in Fig. 2 which functions as a socket for receiving the hinge arm 1.

The hinge arm 1 comprises a main arm portion 11 which projects from a base 12 shaped for functioning as an end cap for insertion into the end of a structural frame

member of a frame of an electrical cabinet. The main arm portion 11 is curved and at its free end it rotatably carries a pin assembly 13 comprising a shaft 14, a collar 15 and a pin 16. The shaft 14 is rotatably received in a vertical through hole 17 at the free end of the main arm portion 11. The collar 15 rests on the top surface of the main arm portion 11.

The shaft 14, collar 15 and pin 16 are integral with one another so that the pin assembly 13 rotates as a single unit.

The hinge recess 2 comprises a box-like body 21 having three main side walls 22, 23 and 24. There are also top and bottom walls 25, 26. Flanges 27 are folded outwardly from the walls 24, 25 and 26. The three flanges 27 lie in a common plane and two of them have apertures 29 to enable the hinge recess 2 to be fitted to a removable door panel.

A portion 231 of the side wall 23 is higher than the rest of the base of the body and is linked to the main part of the side wall 23 by a sloping connecting portion 232 of the side wall 23.

A hinge hole 28 is provided in the top wall 25.

During insertion of the hinge arm into the hinge recess, the operator needs to aim the hinge arm only generally towards the corner containing the hinge hole 28 because if, as viewed in Fig. 2, the hinge arm 1 is too far over to the left the collar 15 will impact on the inner face of the side wall 22 and be deflected towards the right to end up at a first position at which the pin 16 is generally aligned under the hole 28.

If the hinge arm enters the hinge recess too far over to the right, as viewed in Fig. 2, the collar 15 will impact on the side wall portion 231 and be deflected or

guided slightly leftwards so that, by the time the collar 15 reaches the bottom of the groove defined by the side wall 22 and side wall portion 231, the pin 16 will be correctly generally aligned under the hinge hole 28.

The inner face of the side wall 22 and the inner face of the side wall portion 231 are generally elongate planar surfaces that are orthogonal to one another so as to define the groove into which the collar 15 is seated when the hinge arm reaches a first position in the hinge recess. In this first position, the pin 16 is spaced away from the hinge recess 2.

Relative movement is then produced between the hinge arm 1 and hinge recess 2 such that the collar 15 slides along the base of the groove in which it is seated, to start to insert the pin 16 in the hinge hole 28. In the first position, the longitudinal axis of the pin 16 is slightly lower down in the groove than the axis of the hinge hole 28. Consequently, a chamfered leading edge 161 of the pin 16 is used to lift the pin 16 slightly up in the groove and into correct alignment with the axis of the hinge hole 28 as the pin proceeds fully into the hole as the hinge arm reaches its second, final position. Because of the lifting action of the leading edge 161, the collar 15 is unseated from the groove defined by the side wall 22 and side wall portion 231. This is so that, in use, there is no unwanted frictional rubbing of the hinge recess 2 against the cylindrical side surface of the collar 15.

In the second, final position achieved at the end of the assembly operation, the top wall 25 rests on the top end surface of the collar 15 which thereby acts as a shoulder.

It may be seen that the collar 15 acts a spacing member in the first position, for spacing the pin 16 away from the guide surfaces of the groove in the corner of the hinge recess 2, whilst generally correctly positioning the pin 16 under the hole 28

ready for its insertion into that hole upon movement from the first position to the second position.

The side wall 22, side wall portion 231 and top wall 25 are mutually orthogonal. This is the preferred arrangement. In an alternative, the internal angle between the side wall 22 and side wall portion 231 could be greater or less than 90° as long as the function is achieved of correctly guiding the hinge arm to its first, seated position in the corner of the hinge recess under the hinge hole 28.

Fig. 3 shows how the hinge connection of the present embodiment may be used in use. The base 12 is inserted into the end of a structural frame member 31 of the frame of an electrical cabinet. The hinge recess 2 is inserted into a side strengthening member 32 of a removable door panel of the electrical cabinet. Thus, in use, the hinge arm 1 will be static and it is the hinge recess 2 which moves relative to the hinge arm 1. Therefore, when moving to the first position, the operator looks to ensure that a pushing motion will generally insert the pin assembly 13 into the corner of the hinge recess under the hinge hole 28. Precise alignment is not required before the pushing operation commences, because the collar 15 will be guided by the side wall 22 and side wall portion 231 to the correct position. Then, the operator can release the weight of the door panel and produce the relative sliding movement from the first position to the second, final position at which the pin 16 is fully received in the hinge hole 28 and the collar 15 has lifted slightly clear from being seated in the corner of the hinge recess.

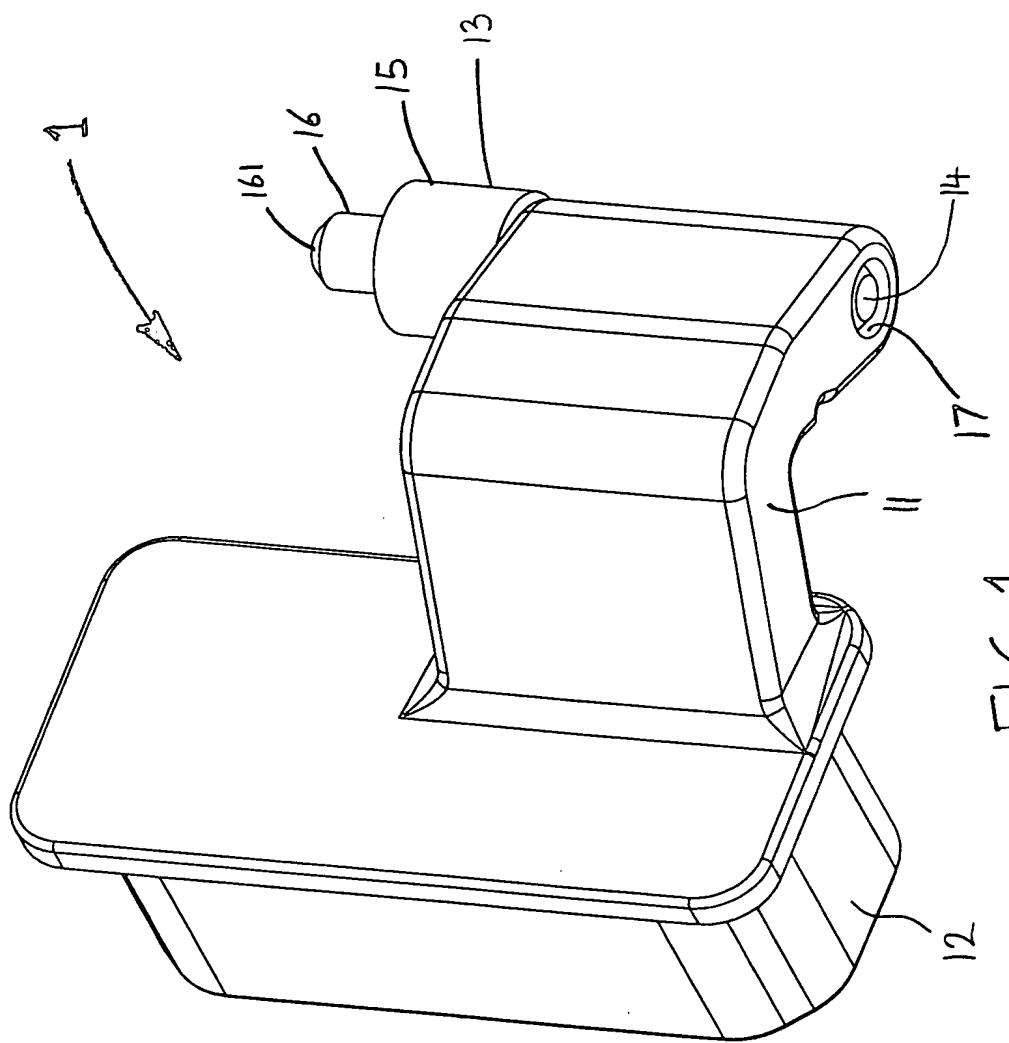
CLAIMS

1. A hinge connection comprising:
 - a hinge arm at the end of which is a hinge pin; and
 - a hinge recess having a corner for guiding the hinge arm to a first position at which the hinge arm is seated in the corner and from which the hinge arm is slideable relative to the hinge recess along the corner to a second position to insert the hinge pin into a hinge hole of the recess whilst unseating the hinge arm from the corner.
2. A hinge connection according to claim 1, wherein the end of the pin is chamfered such that, during the movement from the first position to the second position, the chamfer lifts the hinge arm out of seated engagement with the corner of the recess.
3. A hinge connection according to claim 1 or 2, wherein the hinge arm has a spacing member which:
 - protrudes radially beyond the hinge pin;
 - in the first position is in seated engagement with the corner of the recess whilst spacing the hinge pin away from the corner; and
 - in the second position is no longer in seated engagement with the corner.
4. A hinge connection according to claim 3, wherein the spacing member has a cylindrically curved surface.
5. A hinge connection according to claim 4, wherein the spacing member has a surface which is circumferentially a complete cylinder.

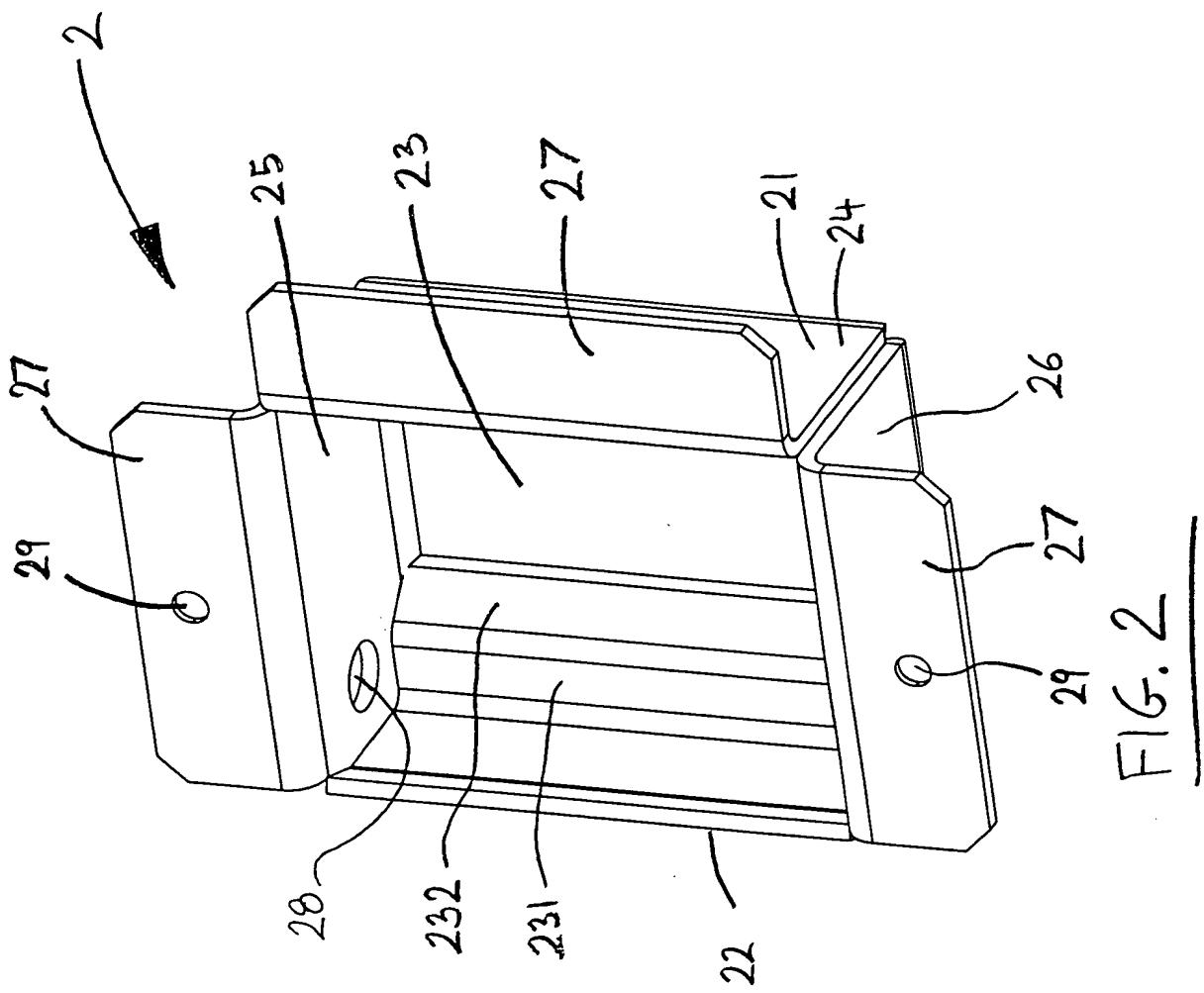
6. A hinge connection according to claim 5, wherein the spacing member is integral with the hinge pin and these components are rotatably mounted at the end of a main arm portion of the hinge arm.
7. A hinge connection according to any one of claims 3 to 6, wherein the spacing member is contiguous with the hinge pin.
8. A hinge connection according to any preceding claim, wherein the corner of the recess comprises guide surfaces which define a groove and against which the hinge arm seats when in the first position.
9. A hinge connection according to claim 8, wherein the hinge hole is provided in an end surface at an end of the groove.
10. A hinge connection according to claim 8 or 9, wherein the guide surfaces are planar.
11. A hinge connection according to claim 10, wherein the guide surfaces are generally orthogonal.
12. A hinge connection according to claim 9 and claim 11, wherein the end surface is orthogonal to the guide surfaces.
13. An electrical cabinet for electronic and electrical components, comprising a hinge connection according to any preceding claim and a frame having a frame member at the end of which is the hinge arm and a removable door panel including the hinge recess.

14. A hinge connection substantially as herein described with reference to, or with reference to and as illustrated in, the accompanying drawings.

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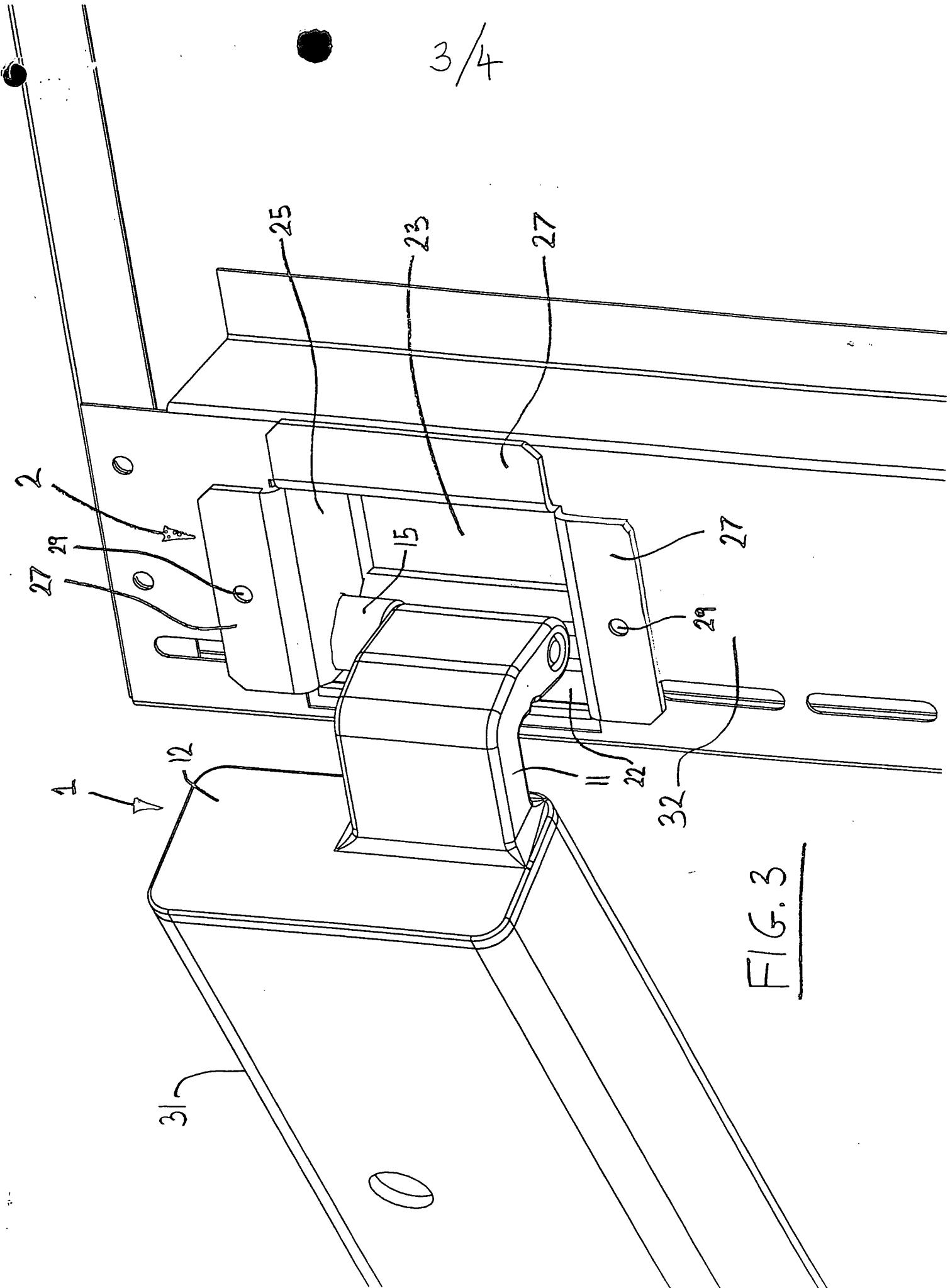


FIG. 3

